

~~6100-1-12~~

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

*Technical Memorandum No. 106.*

COMFORT IN FLIGHT

By Edward P. Warner,  
Professor of Aeronautics,  
Massachusetts Institute of Technology.

FILE COPY

To be returned to  
the files of the Langley  
Memorial Aeronautical  
Laboratory.

June, 1932.

7.5



## COMFORT IN FLIGHT.

By Edward P. Warner,  
Professor of Aeronautics,  
Massachusetts Institute of Technology.

The position of a passenger in an airplane has greatly improved. From the somewhat precarious attitudes that it was necessary to adopt in the early aircraft, there has developed the luxury of the modern flying Pullman. Those who were fortunate enough to be taken up in the early days find it hard to believe when they examine the most recent commercial aircraft that it was really necessary only 10 years ago for them to crawl into place through an intricate mass of wires and finally to perch themselves unstably on top of a gasoline tank or on the edge of the wing itself.

The very nature of the advances that have been made in assuring the passengers bodily comfort, however, has produced some accompanying drawbacks. The airplane of 1912, to be sure, forced the passenger to ride in the open. It required him to manifest the agility of an acrobat when getting into place and to don what appeared to be the habiliments of an arctic explorer together with those of a deep-sea diver. At least, however, there was always a certainty of plenty of ventilation and the possibility of rapidly extricating oneself from the wreckage in case accidents should happen. The airplanes of 1922 are far safer and far better in practically every way than those of 1912, but the use of inclosed cabins on these recent commercial productions has given rise

\* Taken from "The Christian Science Monitor."

to some problems which designers have not always solved in a fully satisfactory manner.

### Ventilated Cabins.

Notwithstanding the difficulties that ventilation presents, the inclosed cabin has come to stay and its ventilation is simply one more problem which the designer must keep in mind. That the problem can be solved is best indicated by the existence of several machines which have completely inclosed cabins but in which there is no more liability of discomfort than in any airplane with a perfectly open cockpit for the passenger.

Ventilation is obtained in part by a regular system for circulating air through the cabin, taking it in at the bottom and discharging it at the top, in part by providing windows which can be opened or closed at the will of the passenger. The tendency in the most recent commercial designs is to provide really large and effective windows in swinging or sliding frames in place of the small port-holes characteristic of several of the first attempts at a completely closed cabin.

### Heating the Airplane.

The problem of securing ventilation which will afford a maximum of protection is to be sure a major one in a design of the cabins of commercial aircraft, but it does not stand alone. Of almost equal importance is the necessity of securing warmth, for it is unreasonable to expect the passengers on commercial air lines to dress more warmly than they would have to on the same day on the

ground. The desirability of some effective means of heating is becoming particularly marked in view of the widespread discussion of the possibility of flying commercial airplanes at very high altitudes where the decreased density of the air permits of more efficient performance and higher speeds with proper power plant equipment. If airplanes are to fly at 500 feet, it is advisable that the cabin be heated. If they are to fly at 25,000 feet it is so essential as to leave no room for discussion.

The heating can be carried out electrically or by the exhaust from the engine. The exhaust heat is most generally employed as the agency, but it is of course necessary to take every precaution against the leakage of gas into the passenger compartment.

#### Seating Arrangements.

After warmth and ventilation comes seating accommodation. The power required to drive an airplane is increased by the increase in the size of the body and it is, therefore, the ambition of the designer to stow his load of passengers in the smallest possible space. The fulfillment of that ambition, however, often leaves the passenger of more than average bulk with little room for his accommodation, and the seats are sometimes placed so close together as to require the maintenance of a position rather uncomfortable on a long trip. Fortunately, this, like the other difficulties named, has received much study recently and is likely to give rise to but little trouble to aircraft now in operation or coming into use in the future.

In addition to being so placed as to give plenty of room to each passenger, the seats should be arranged in such a way as to permit the occupants to move about and change places freely. Swivel chairs, such as are used in parlor cars but of lighter construction, are found very satisfactory.

#### Doors in Top and Bottom.

A final point of some importance deals with the means of egress in case of that rare event, an accident in landing. Several of the modern commercial aircraft are fitted with doors in the top and bottom of the body permitting of easy exit in case the ordinary door should become jammed or impossible to use for any reason.

In a few instances every seat in the cabin has been fitted with a safety belt to keep the passengers from being thrown from their seats. This precaution, however, is really no more necessary in the cabin of a commercial airplane than in a railroad train.

Compared with such virtual fundamental points as these the nature of the interior furnishing is of little importance. The steps taken by the various manufacturers to beautify their airplane cabins with pictures on the walls, paneled ceilings in delicate shades, lace curtains, sunken electric lights and vases of flowers are of relatively minor significance, but they are none the less interesting as showing the eagerness with which aircraft companies are going after business and the care which they are taking to overlook no possible means of appeal, either material or aesthetic.



[Faint, illegible text covering the majority of the page, likely bleed-through from the reverse side.]